OPERATION & MAINTENANCE MANUAL

DFI No. D00045
Facility Type: Water Quality Bifiltration Swale

MARCH, 2011

INDEX

1. Identification

Drainage Facility ID (DFI):	**D00045**
Facility Type:	Water Quality Swale
Construction Drawings:	(V-File Number) 38V-117
Location:	District: 3
	Highway Number: 001
	Mile Post: 252.65 / 252.82 (beg./end)
	Description: This facility is located east of the right shoulder of NB I-5 (Hwy 001). Access is obtained through a specialized access gate in the concrete barrier.

2. Facility Contact Information

Contact the Engineer of Record, Region Technical Center or Geo Environmental's Senior Hydraulics Engineer for:

- Operational clarification
- Maintenance clarification
- Repair or restoration assistance

Engineering Contacts:

Region Technical Center, Hydro Unit Manager

Or

Geo-Environmental's Senior Hydraulics Engineer (503) 986-3365.

3. Construction

Engineer of Record: ODOT Designer - Region 2 Tech. Center, Chris Carman, P.E., (503) 986-2691

Construction Year: 2005
Contractor: Hamilton Construction Company

4. Storm Drain System and Facility Overview

A water quality swale is a flat-bottomed open channel designed to treat stormwater runoff from highway pavement areas. This type of facility is lined with grass. Treatment by trapping sedimentation occurs when stormwater runoff flows through the grass.

The swale is approximately 919-feet long with a mild slope; see the Operational Plans and Photo 1. Runoff from both the southbound and northbound lanes of I-5 (Hwy 001) enters the swale through three 12-inch pipes (Points A, B, & C of the Operational Plans). Three flow spreaders (Points E) evenly spread the flow of water through the swale. Additional influent enters the swale as sheet flow from a portion of I-5's (Hwy 001) northbound lanes.

The swale's outlet drains into a manhole which then drains into Mill Creek through a reinforced concrete box culvert; see Point D of the Operational Plan and Photos 3 & 4.

A. Maintenance equipment access:
Access is obtained through an access gate (Photo's 5 & 6) located on the right shoulder approximately 0.1 miles north of the swale's outlet. This gate can be opened to utilize an access road (Photo 5), running parallel to the swale.

B. Heavy equipment access into facility:

☒ Allowed (no limitations)
☐ Allowed (with limitations)
☐ Not allowed

C. Special Features:

☐ Amended Soils
☐ Porous Pavers
☐ Liners
☐ Underdrains

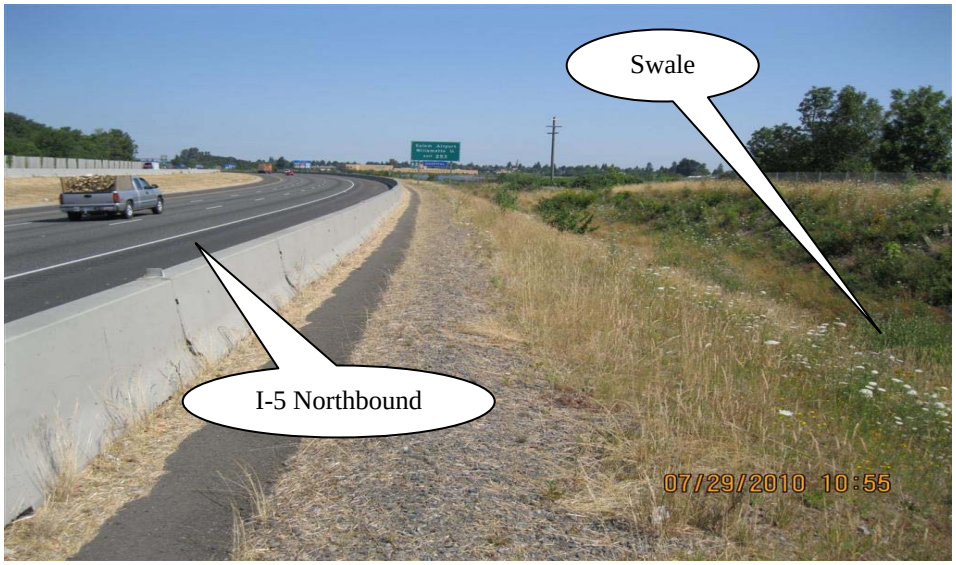


Photo 1: Swale

Photo 2: Inlet & Outlet of the Northern Swale.

Photo 3: Swale Outlet

Photo 4: Outlet & Flow Control Manhole

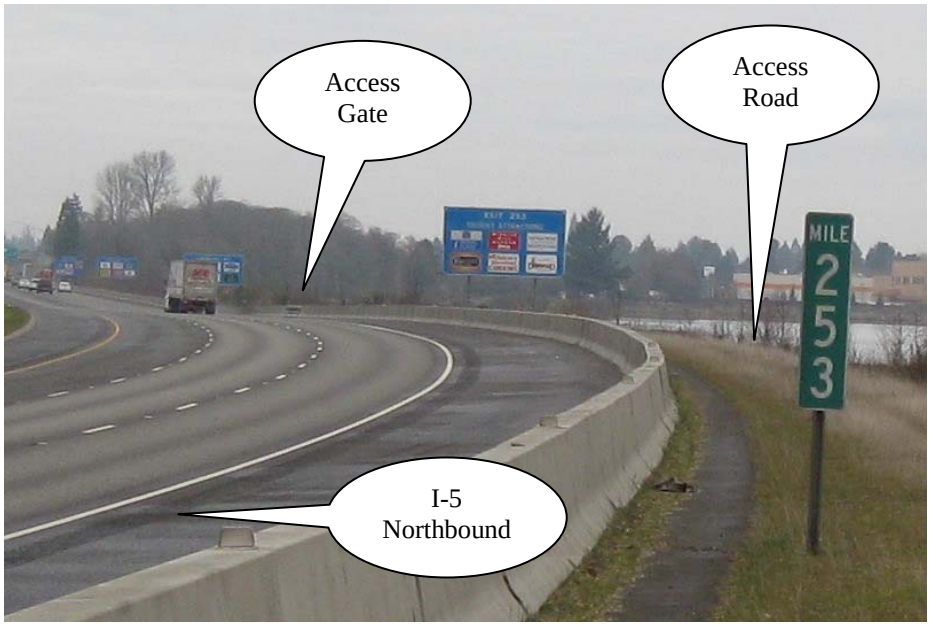


Photo 5: Access gate

Photo 6: Access Gate

5. Facility Haz Mat Spill Feature(s)

The swale can be used to store a volume of liquid by blocking the 24-inch diameter outlet pipe located at the downstream end of the swale. This pipe is noted as Point D in the Operational Plans in Appendix A and in Photo 3.

6. Auxiliary Outlet

Auxiliary Outlets are provided if the primary outlet control structure can not safely pass the projected high flows. Broad-crested spillway weirs and over flow risers are the two most common auxiliary outlets used in stormwater treatment facility design. The auxiliary outlet feature is either a part of the facility or an additional storm drain feature/structure.

The auxiliary outlet feature for this facility is:

☐ Designed into facility:

☒ Other, as noted below:
There are no auxiliary outlets designed into this facility.

7. Maintenance Requirements

Routine maintenance table for non-proprietary stormwater treatment and storage/detention facilities have been incorporated into ODOT's Maintenance Guide. These tables summarize the maintenance requirements for ponds, swales, filter strips, bioslopes, and detention tanks and vaults. Special maintenance requirements in addition to the routine requirements are noted below when applicable.

The ODOT Maintenance Guide can be viewed at the following website:

http://www.oregon.gov/ODOT/HWY/OOM/MGuide.shtml

Maintenance requirements for proprietary structures, such as underground water quality manholes and/or vaults with filter media are noted in Appendix C when applicable.

The following stormwater facility maintenance table (See ODOT Maintenance Guide) should be used to maintain the facility outlined in this Operation and Maintenance Manual or follow the Maintenance requirements outlined in Appendix C when proprietary structure is selected below:

- ☒ Table 1 (general maintenance)
- ☐ Table 2 (stormwater ponds)
- ☒ Table 3 (water quality biofiltration swales)
- ☐ Table 4 (water quality filter strips)
- ☐ Table 5 (water quality bioslopes)
- ☐ Table 6 (detention tank)
- ☐ Table 7 (detention vault)
- ☐ Appendix C (proprietary structure)
- ☐ Special Maintenance requirements:

Note: Special maintenance Requirements Require Concurrence from ODOT SR Hydraulics Engineer.

8. Waste Material Handling

Material removed from the facility is defined as waste by DEQ. Refer to the roadwaste section of the ODOT Maintenance Yard Environmental Management System (EMS) Policy and Procedures Manual for disposal options: http://egov.oregon.gov/ODOT/HWY/OOM/EMS.shtml

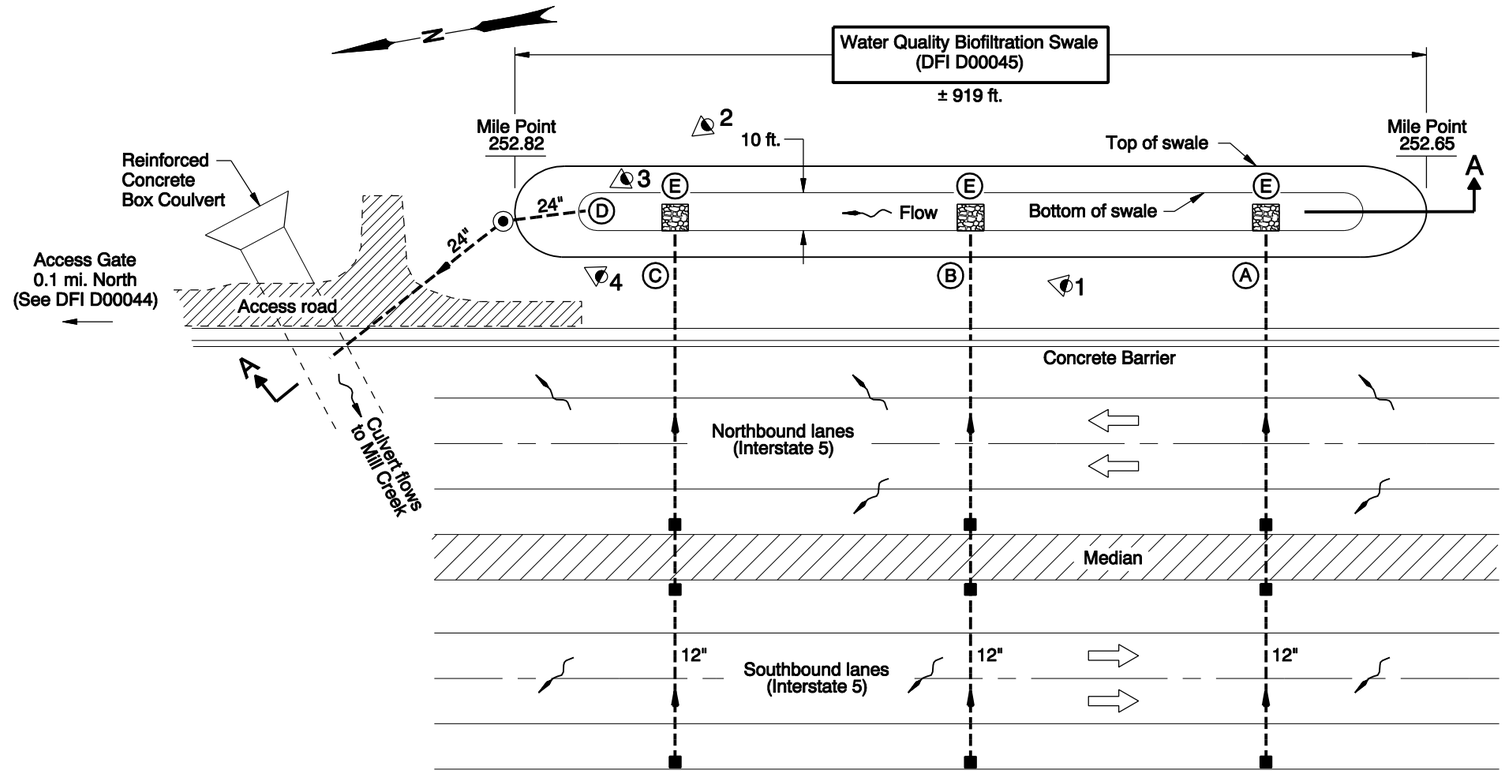
Contact any of the following for more detailed information about management of waste materials found on site:

ODOT Clean Water Unit	(503) 986-3008
ODOT Statewide Hazmat Coordinator	(503) 229-5129
ODOT Region Hazmat Coordinator	(503) 986-2647
ODEQ Northwest Region Office	(503) 229-5263

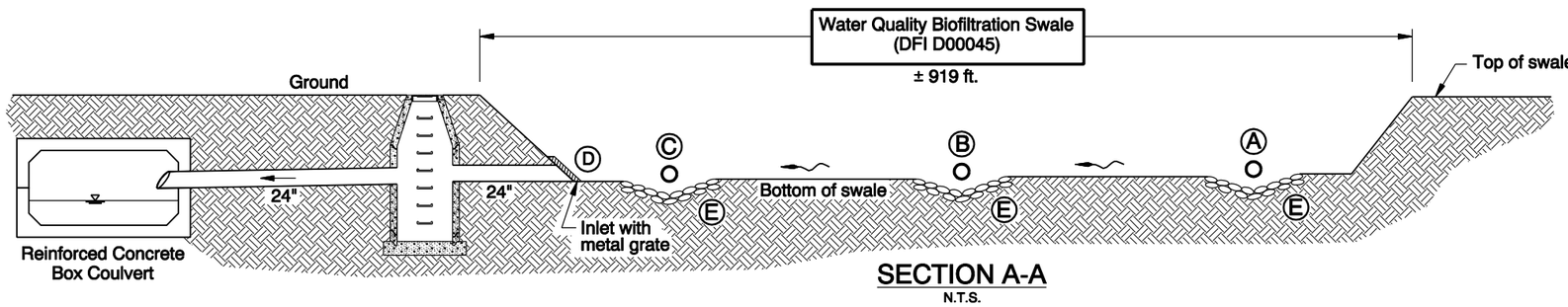
Appendix A

Content:

- **Operational Plan and Profile Drawing(s)**



PLAN
N.T.S.



SECTION A-A
N.T.S.

LEGEND:
- Photo Location / Direction
- (A)(B)(C) Swale Inlet
- (D) Swale outlet
- (E) Flow spreader
- Manhole
- Inlet
- Storm Pipe (Facility)
- Conveyance Direction
- Pavement / Facility Flow Path
- Traffic direction

Sht. 1 of 1

OREGON DEPARTMENT OF TRANSPORTATION

Prepared By: M. Wittenbrink

Drafted By: Jim Holeman

DFI D00045
MAINTENANCE DISTRICT 3 HWY 1
WATER QUALITY BIOFILTRATION SWALE
PACFIC HIGHWAY MP 252.65-252.82
MARION COUNTY

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DFI_D00045.dgn

Appendix B

Content:

- **ODOT Project Plan Sheets**
    - ***Cover/Title Sheet***
    - ***Water Quality/Detention Plan Sheets***
    - ***Details***

38V-117

INDEX OF SHEETS	
SHEET NO.	DESCRIPTION
1	Title Sheet
1A	Index Of Sheets Cont'd.
1A-2	Index Of Sheets Cont'd.
1A-3	Index Of Sheets Cont'd.
1A-4	Standard Drawing Nos.
1B	Layout Sheet

STATE OF OREGON

DEPARTMENT OF TRANSPORTATION

PLANS FOR PROPOSED PROJECT

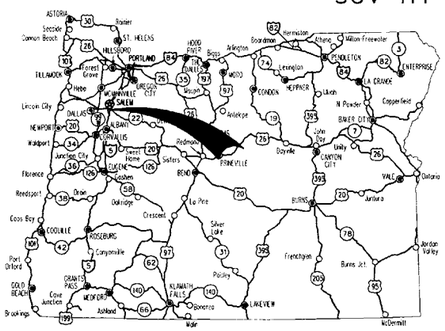
GRADING, DRAINAGE, STRUCTURES, PAVING, SIGNING, ILLUMINATION, SIGNALS & ROADSIDE DEVELOPMENT

I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.

PACIFIC HIGHWAY

MARION COUNTY

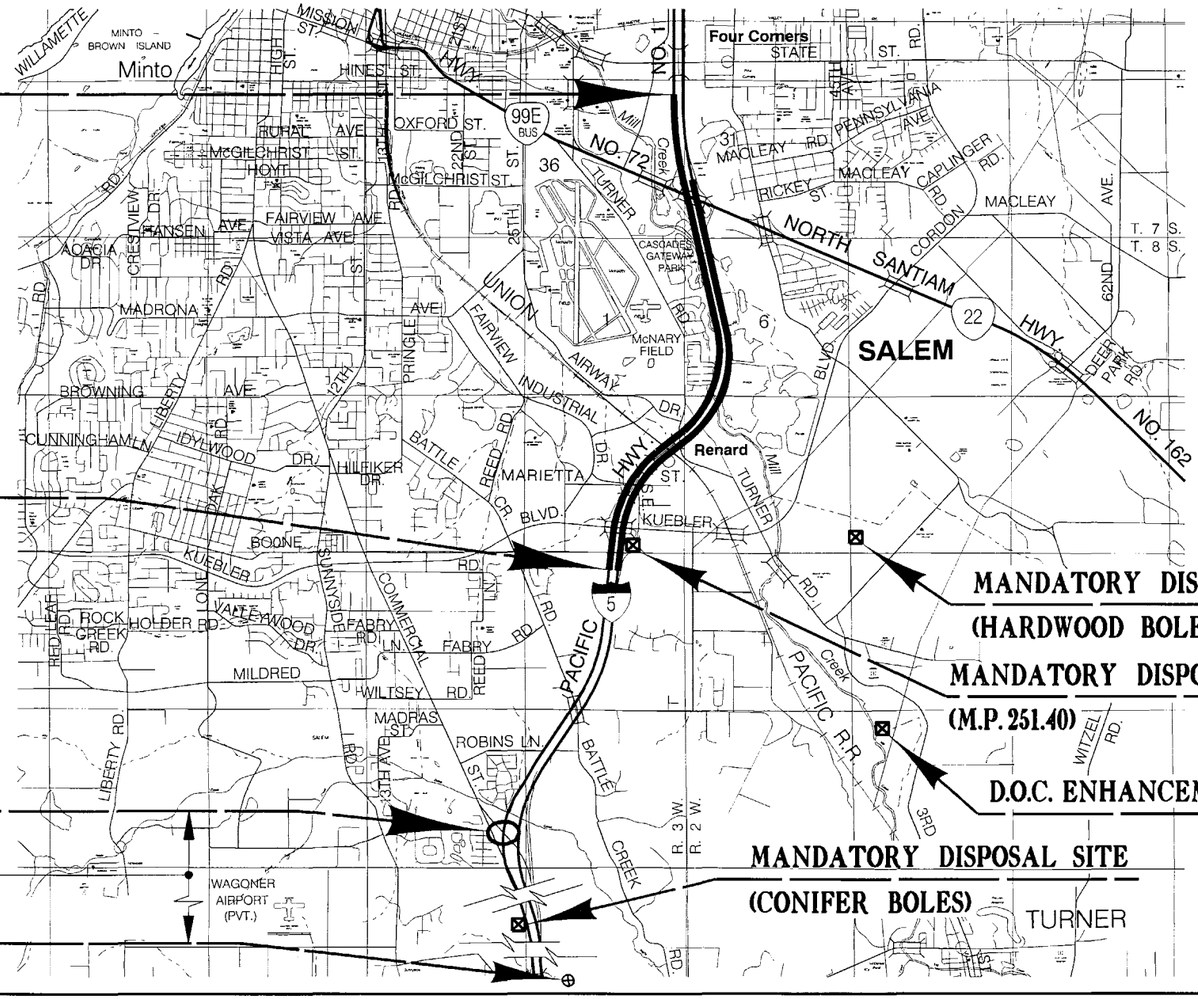
OCTOBER 2005



Overall Length Of Project - 4.02 km (2.49 Miles)

ATTENTION:
Oregon Law Requires You To Follow Rules Adopted By The Oregon Utility Notification Center. Those Rules Are Set Forth In OAR 952-001-0010 Through OAR 952-001-0090. You May Obtain Copies Of The Rules By Calling The Center. (Note: The Telephone Number For The Oregon Utility Center Is (503) 232-1987.)

OTIA-NH-IM-S001(196)
BEGINNING OF PROJECT
STA. "L" 10+280 (M.P. 254.58)



END OF WORK AREA
STA. "L" 15+682.3 (M.P. 251.22)

NO WORK AREA

OTIA-NH-IM-S001(196)
END OF PROJECT
STA. "LS" 18+664.61 (M.P. 249.38)

Approx. 28 Mi. South

PROSPECTIVE MATERIAL SOURCE
(M.P. 221.13)

MANDATORY DISPOSAL SITE
(HARDWOOD BOLES)

MANDATORY DISPOSAL SITE
(M.P. 251.40)

D.O.C. ENHANCEMENT SITE

MANDATORY DISPOSAL SITE
(CONIFER BOLES)

OTIA
OREGON TRANSPORTATION INVESTMENT ACT

LET'S ALL WORK TOGETHER TO MAKE THIS JOB SAFE

OREGON TRANSPORTATION COMMISSION

Stuart Foster	CHAIRMAN
Gail L. Achterman	COMMISSIONER
Mike Nelson	COMMISSIONER
Randall Papé	COMMISSIONER
Janice J. Wilson	COMMISSIONER
Bruce A. Warner	DIRECTOR OF TRANSPORTATION

REGISTERED PROFESSIONAL ENGINEER
13,704
OREGON
JULY 16, 1987
CATHERINE M. NELSON
Expires Dec. 31, 2006

Catherine M. Nelson
TECHNICAL SERVICES MANAGING ENGINEER

I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

FEDERAL HIGHWAY ADMINISTRATION	PROJECT NUMBER	SHEET NO.
OREGON DIVISION	OTIA-NH-IM-S001(196)	1

METRIC

PE000950

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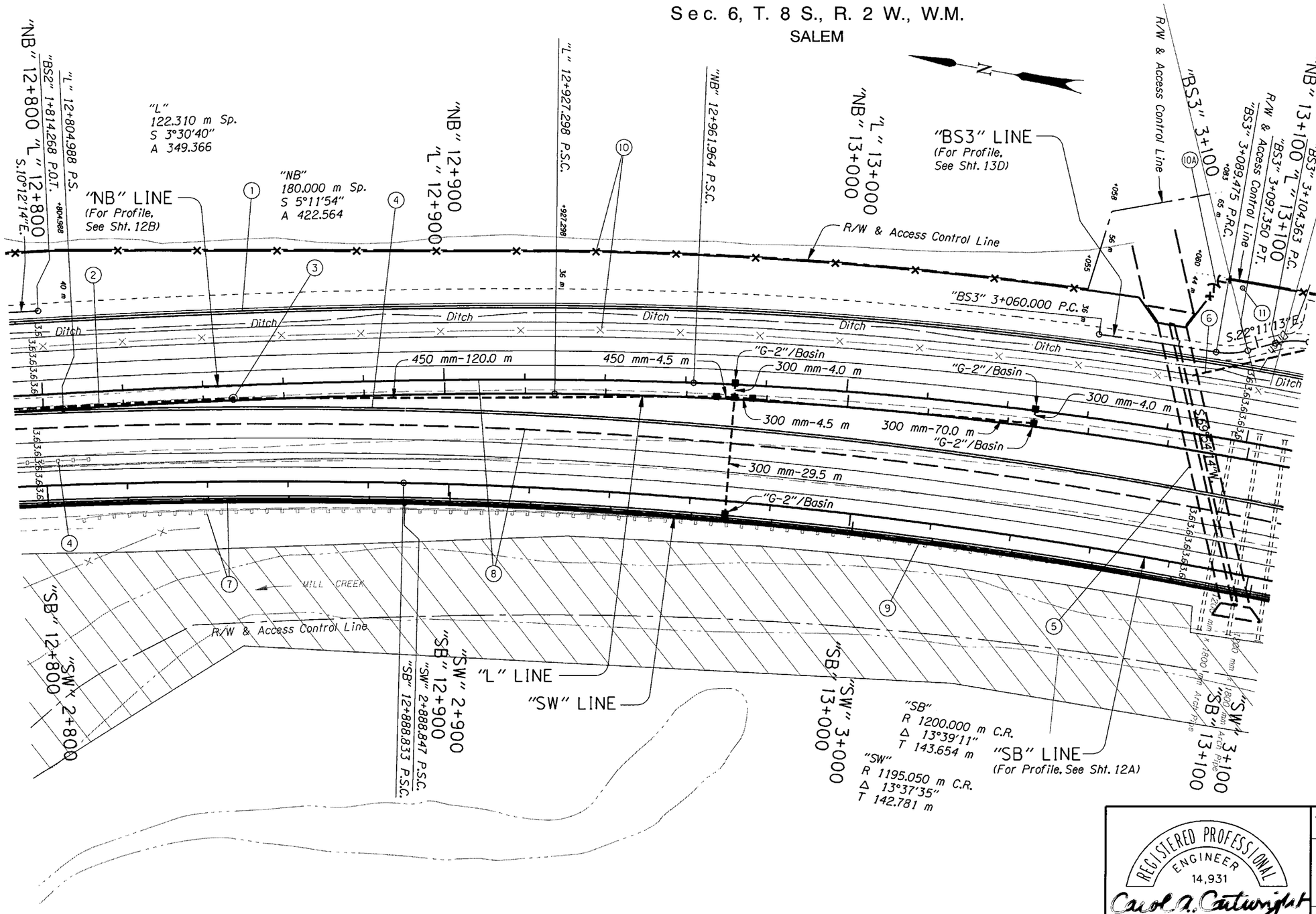
Sec. 6, T. 8 S., R. 2 W., W.M.
SALEM



Restricted Work Area Shown Thus:

1. Sta. "NB" 12+794.1 To Sta. "NB" 13+535.9
   Const. Precast Conc. Shldr. Barrier - 740.2 m
   (Reflectorized)
   Plug Scuppers
   Flare Rate=0, W=0, E=0
2. See Sht. 11A, Note 10
   Inst. 450 mm Sew. Pipe
3. Sta. "L" 12+847.5 To Sta. "L" 13+047.0
   Const. Manhole
   Const. Type "G-2" Open Grade HMAC Inlet With Basin - 4
   0.45 m Deep
   Const. Type "G-2" Open Grade HMAC Inlet - 3
   Shape Bottom
   Adjust Inlet For Wearing Course - 3
   Inst. 300 mm Sew. Pipe - 112.0 m
   1.5 m Depth
   Inst. 450 mm Sew. Pipe - 124.5 m
   1.5 m Depth
   (See Drg. Nos. RD336 & RD344)
4. See Sht. 7, Note 3
   Remove Extg. Metal Median Barrier
   Const. Precast Tall Conc. Median Barrier
5. Structure No. 20109
   Const. Double 2.4 m x 1.2 m R.C.B.C. - 72.6 m
   (For Drg. Nos., See Sht. 1A)
6. Sta. "NB" 13+084.1 To Sta. "NB" 13+114.6
   Inst. 600 mm Sew. Pipe - 34.0 m
   1.5 m Depth
   Connect To 2.4 m x 1.2 m R.C.B.C.
7. See Sht. 9A, Note 9
   Remove Extg. Guardrail
   Const. Precast Conc. Shldr. Barrier
8. Const. Low Profile Mountable Curb
9. See Sht. 8A, Note 12
   Const. Soundwall
10. See Sheet 10A, Note 9
    Remove Extg. Fence
    Const. Type CL-6 Fence
    10A Inst. Double Type CL-6 Locked Gate - 4.2 m
11. Sta. "L" 13+091.5, 42.2 m Lt.
    Const. Eagle Perch
    (For Details, See Sht. 2B-14)

All Dimensions Are Shown In Meters (m)
Unless Otherwise Noted.

REGISTERED PROFESSIONAL ENGINEER
14,931
Carol A. Cartwright
OREGON
JULY 25, 1990
CAROL A. CARTWRIGHT
Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

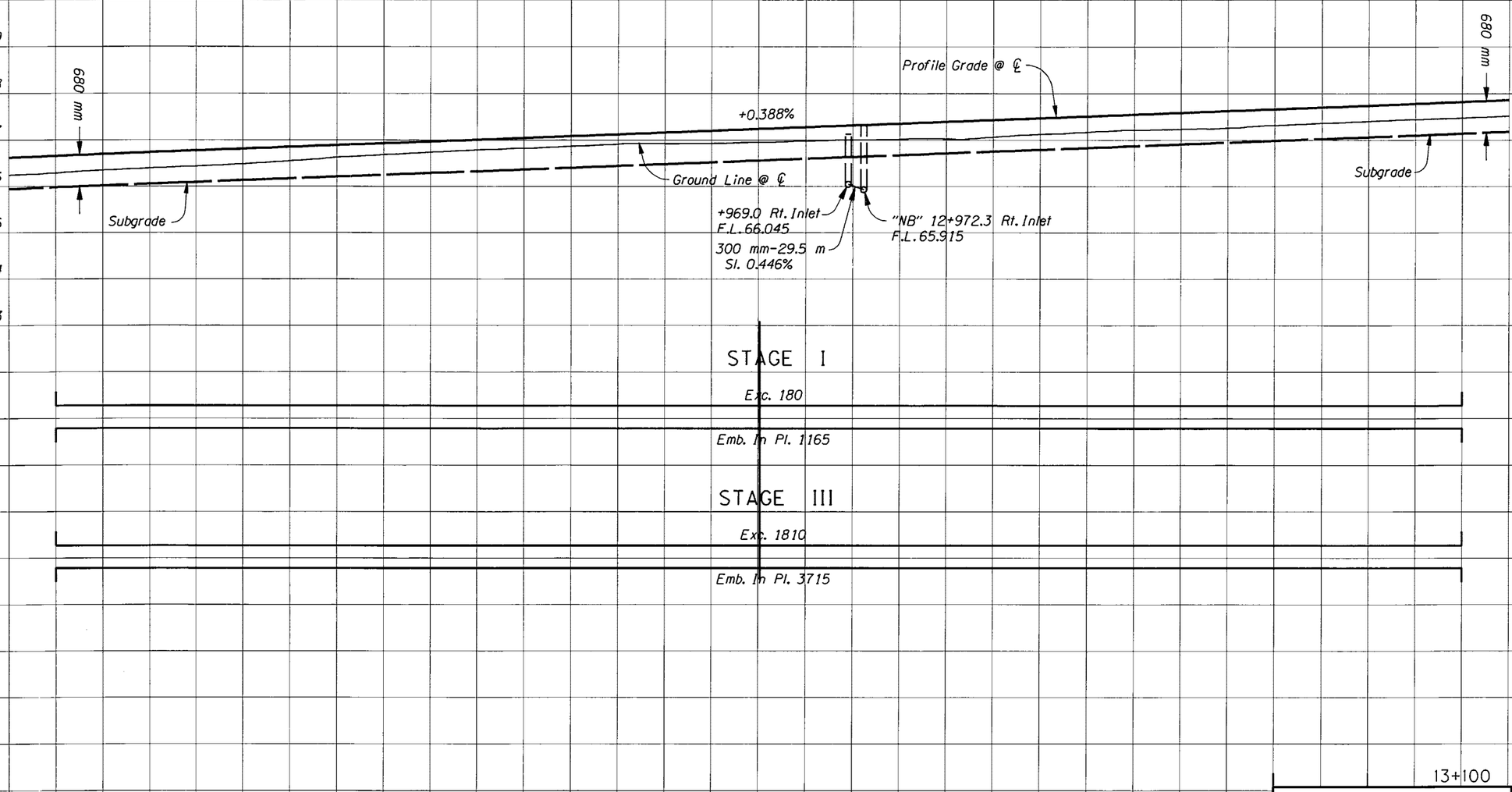
Design Team Leader - Carol Cartwright
Designed By - John Lucas
Drafted By - Jeff Larson

GENERAL CONSTRUCTION

SHEET NO. 12

STRUCTURAL DETAILS CHECKED

"SB" LINE



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MARION COUNTY

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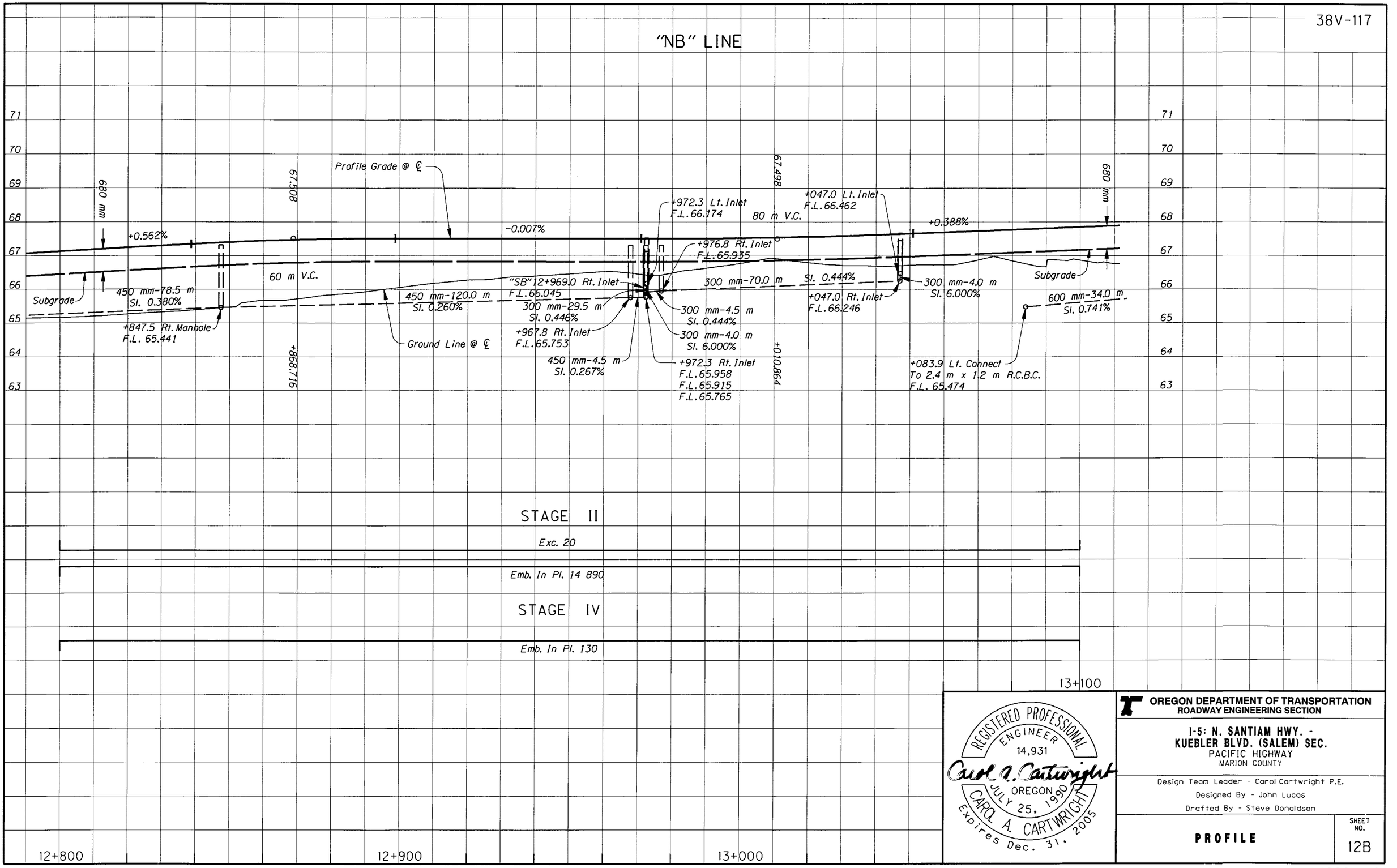
Drafted By - Steve Donaldson

PROFILE

SHEET NO. 12A

"NB" LINE



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MARION COUNTY

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Drafted By - Steve Donaldson

PROFILE

SHEET NO. 12B

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STRUCTURAL DETAILS CHECKED

"NB" 13+100
"BS3" 3+097.350 P.T.
"BS3" 3+104.363 P.C.
"BS3" 3+112.680 P.C.C.
"BS3" R 18.500 m
Δ 24°23'22"
3.998 m
S.22°11'13"E.
"BS3" LINE
(For Profile, See Sht. 13D)
"L" 13+100
"NB" 13+200
"BS3" 3+200
"L" 13+200
"NB" LINE
(For Profile, See Sht. 13C)
"NB" 13+300
"BS3" 3+300
"L" 13+300
"L" LINE
R/W & Access Control Line
"NB" 13+400
"BS3" 3+400
"L" 13+400
Ditch
300 mm-26.0 m
300 mm-25.5 m
300 mm-25.0 m
300 mm-4.0 m
300 mm-113.0 m
300 mm-33.0 m
300 mm-32.0 m
300 mm-76.0 m
"G-2"/Basin
1200 mm x 1800 mm Arch Pipe
1200 mm x 1908 mm Arch Pipe
1800 mm x 1800 mm Arch Pipe
"SW" 3+100
"SB" 13+100
"SB" 13+200
"SW" 3+200
"SB" 13+174.781 P.C.S.
"SW" 3+173.062 P.C.S.
"SW" 3+223.062 P.S.C.
"SB" 13+224.781 P.S.C.
"SB" LINE
(For Profile, See Sht.13B)
"SB" 13+300
"SW" 3+300
"SW" LINE
"MC" 0+000.000 P.O.T.
S.31°22'58"W.
"MC" LINE
MILL CREEK
R/W & Access Control Line
"SB"
50.000 m Sp.
S 2°39'19"
A 516.984
"SW"
50.000 m Sp. Seg.
S 2°40'04"
A 514.612
"SW"
R 975.050 m C.R.
Δ 18°54'17"
T 162.334 m

Restricted Work Area Shown Thus:

No Work Area Shown Thus:

All Dimensions Are Shown In Meters (m) Unless Otherwise Noted.

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OREGON DEPARTMENT OF TRANSPORTATION
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I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Design Team Leader - Carol Cartwright
Designed By - John Lucas
Drafted By - Jeff Larson

GENERAL CONSTRUCTION

SHEET NO. 13

STRUCTURAL DETAILS CHECKED _____

(1) See Sht. 12, Note 6
Inst. 600 mm Sew. Pipe

(2) Sta."NB"13+114.6 To Sta."NB"13+120.0
Const. Manhole
Inst. 600 mm Sew. Pipe - 5.5 m
1.5 m Depth
Const. Paved End Slope

(3) Sta."NB"13+121.8
Const. Type "G-2" Open Grade HMAC Inlet
With Basin
0.45 m Deep
Const. Type "G-2" Open Grade HMAC Inlet - 2
Shape Bottom
Adjust Inlet For Wearing Course - 2
Inst. 300 mm Sew. Pipe - 63.0 m
1.5 m Depth
Const. Paved End Slope
Const. Flow Spreader
(For Details, See Sht. GJ-7)

(4) Const. Water Quality Swale
(For Details, See Shts. 2B-9 & GJ-8)

(5) See Sht. 12, Note 1
Const. Precast Conc. Shldr. Barrier

(6) Sta."NB"13+260.6
Const. Type "G-2" Open Grade HMAC Inlet
With Basin
0.45 m Deep
Const. Type "G-2" Open Grade HMAC Inlet - 2
Shape Bottom
Adjust Inlet For Wearing Course - 2
Inst. 300 mm Sew. Pipe - 62.5 m
1.5 m Depth
Const. Paved End Slope
Const. Flow Spreader
(For Details, See Sht. GJ-7)

(7) Sta."NB"13+399.4 To Sta."SB"13+466.1
Const. Type "G-2" Open Grade HMAC Inlet
With Basin - 2
0.45 m Deep
Const. Type "G-2" Open Grade HMAC Inlet - 3
Shape Bottom
Adjust Inlet For Wearing Course - 4
Inst. 300 mm Sew. Pipe - 250.0 m
1.5 m Depth
Const. Paved End Slope
Const. Flow Spreader
(For Details, See Sht. GJ-7)

(8) See Sht. 7, Note 3
Const. Precast Tall Conc. Median Barrier

(9) See Sht. 12, Note 5
Const. Double 2.4 m x 1.2 m R.C.B.C.

(10) Remove Pipe
Inst. Temp. 450 mm Sew. Pipe - 31.0 m
1.5 m Depth
Connect To Extg. 1200 mm x 1800 mm Arch Pipe
Plug & Abandon 450 mm Pipe

(11) See Sht. 9A, Note 9
Remove Extg. Guardrail
Const. Precast Conc. Shldr. Barrier

(12) Const. Low Profile Mountable Curb

(13) See Sht. 8A, Note 12
Const. Soundwall
(13A) Inst. Single Type "CL-6" Locked Gate - 1.8 m

(14) See Sheet 10A, Note 9
Remove Extg. Fence
Const. Type CL-6 Fence

(15) Const. Temp. Type Orange Plastic Fence

(16) Const. Access Road "Turn-A-Round"
(For Details, See Sht. 2B-8)

REGISTERED PROFESSIONAL ENGINEER
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Carol A. Cartwright
OREGON
JULY 25, 1990
CAROL A. CARTWRIGHT
Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

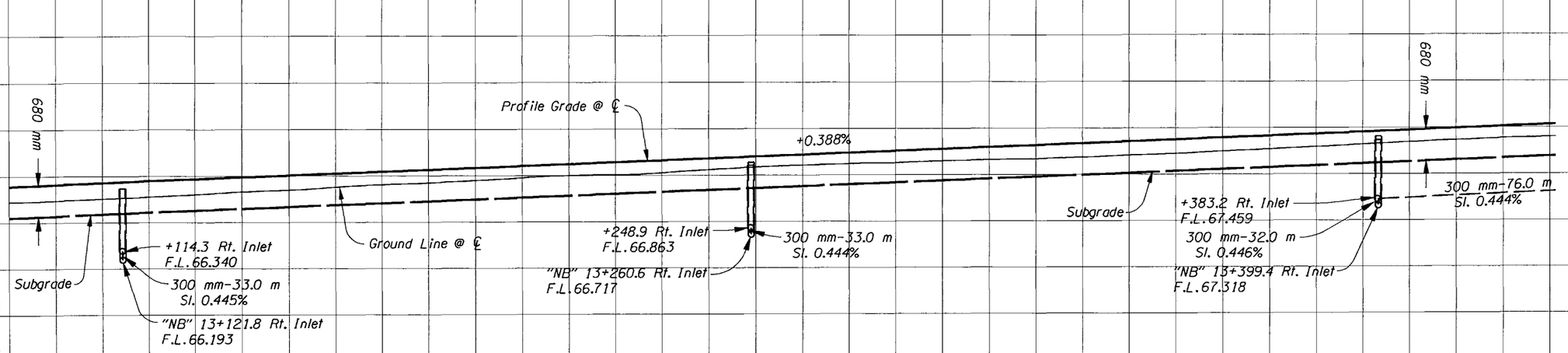
I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Design Team Leader - Carol Cartwright
Designed By - John Lucas
Drafted By - Jeff Larson

NOTES

SHEET NO. 13A

"SB" LINE



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PACIFIC HIGHWAY
MARION COUNTY

Design Team Leader - Carol Cartwright P.E.
Designed By - John Lucas
Drafted By - Steve Donaldson

PROFILE

SHEET NO. 13B

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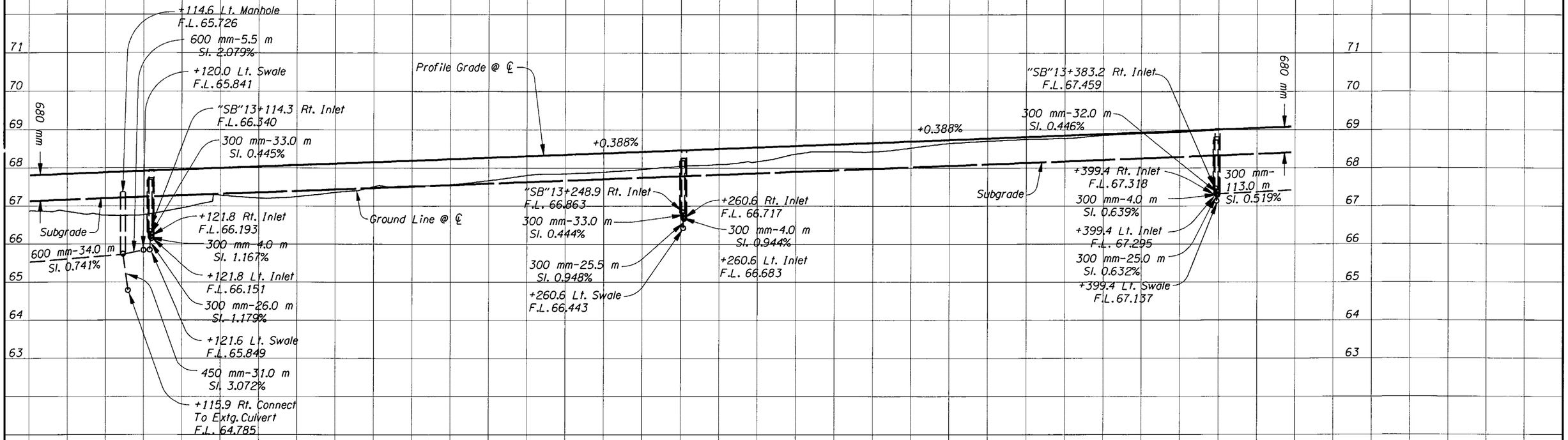
"NB" LINE



REGISTERED PROFESSIONAL ENGINEER
14,931
Carol A. Cartwright
OREGON
JULY 25, 1990
CAROL A. CARTWRIGHT
Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

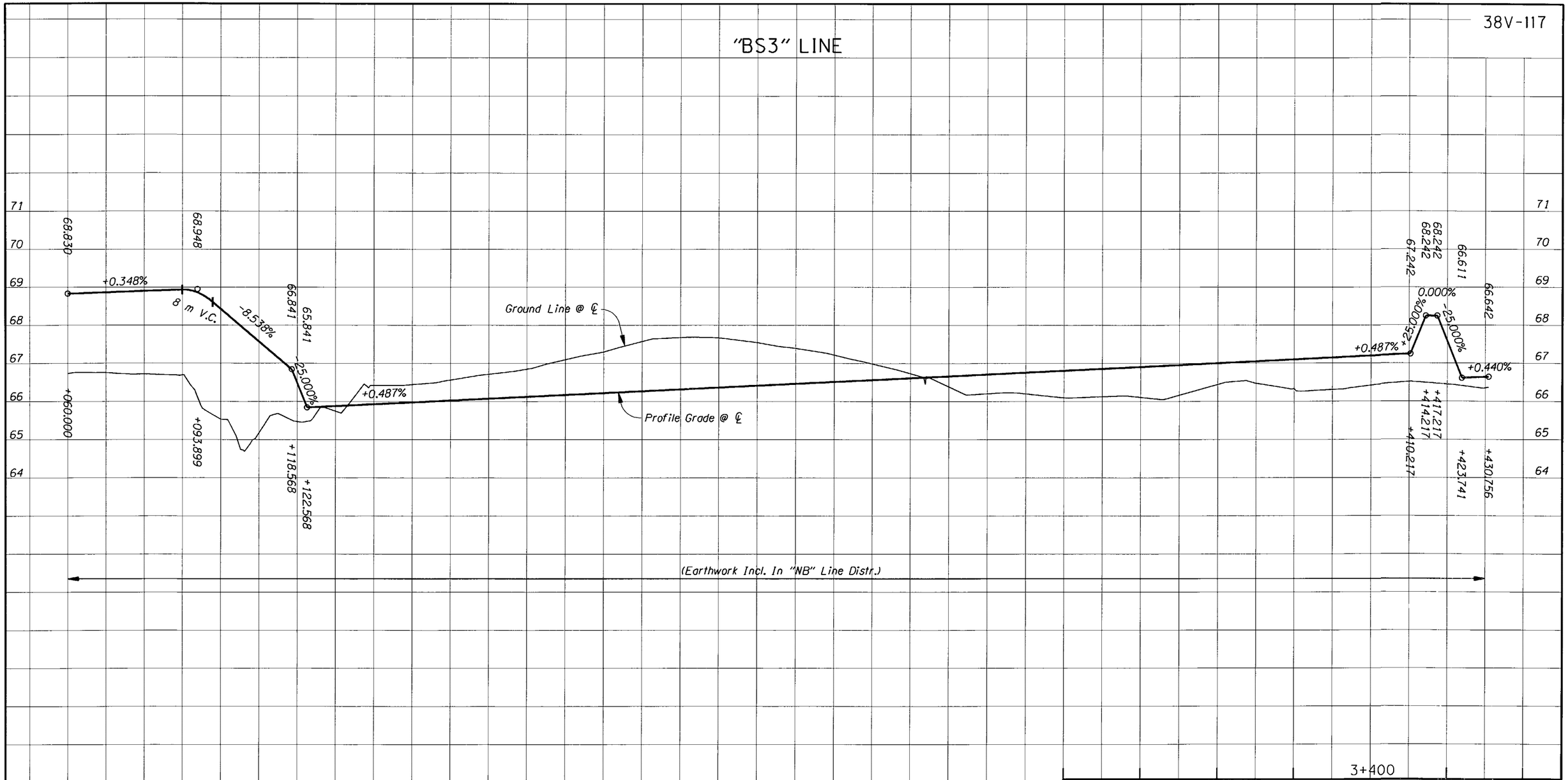
Design Team Leader - Carol Cartwright P.E.
Designed By - John Lucas
Drafted By - Steve Donaldson

PROFILE

SHEET NO. 13C

38V-117

"BS3" LINE



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14,931
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OREGON
JULY 25, 1990
CAROL A. CARTWRIGHT
Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Design Team Leader - Carol Cartwright P.E.
Designed By - John Lucas
Drafted By - Steve Donaldson

PROFILE

SHEET NO. 13D

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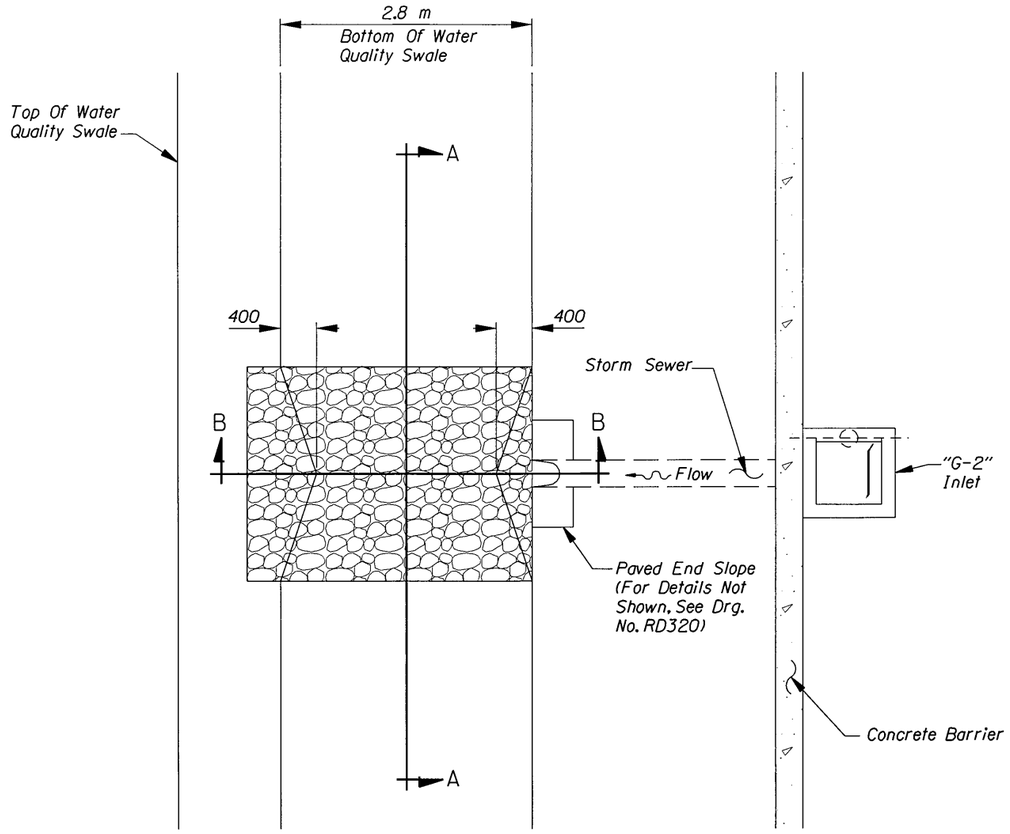
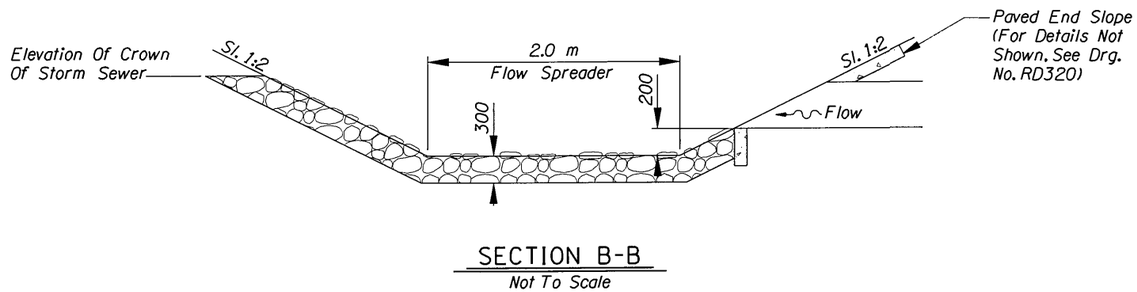
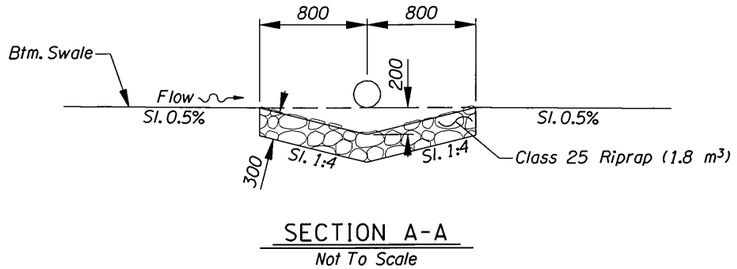


FLOW SPREADER - PLAN
Not To Scale

(For Locations See Sht. 9. 10. 11. 13)



SECTION B-B
Not To Scale



SECTION A-A
Not To Scale

NOTES:
1. Side-Slopes Are Shown As Vert. To Horiz.
2. All Dimensions Shown Are In Millimeters (mm) Unless Otherwise Noted

REGISTERED PROFESSIONAL ENGINEER
17807
OREGON
JULY 25, 1995
CHRIS CARMAN

EXPIRES: December 31, 2005

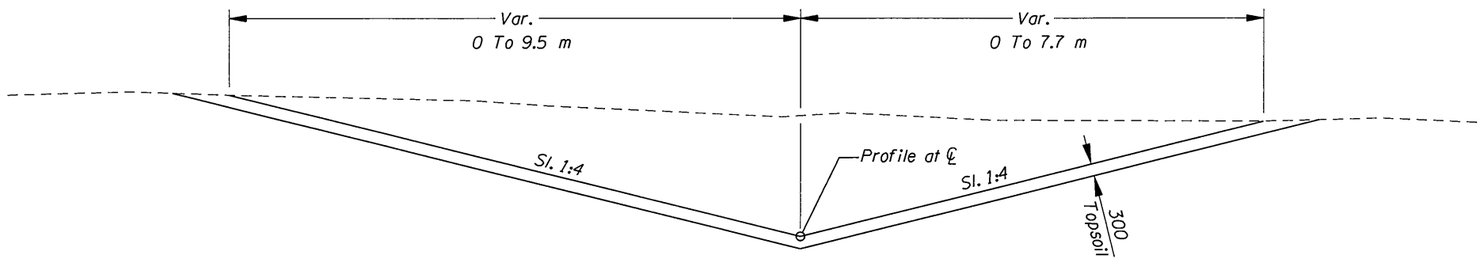
OREGON DEPARTMENT OF TRANSPORTATION
REGION 2 TECH CENTER

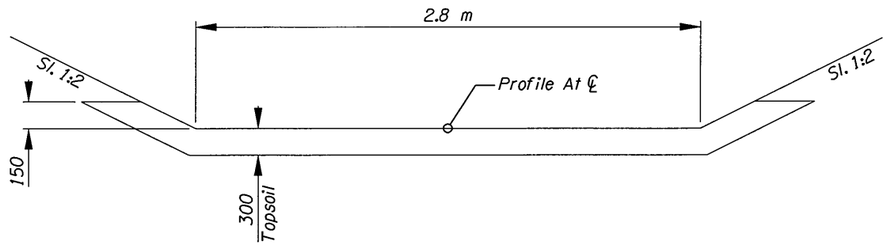
I-5: NORTH SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Reviewed By - Alvin Shoblom
Designed By - Chris Carman
Drafted By - Chris Shearer

DETAILS

SHEET NO. GJ-7





(For Planting Details, See Roadside Development Plans)
(For Locations, See Sht. 2B-9)

WATER QUALITY SWALE - CROSS SECTION

Not To Scale

NOTES:
1. *Side Slopes Are Shown As Vert. To Horiz.*
2. *All Dimensions Shown Are In Millimeters (mm) Unless Otherwise Noted*

REGISTERED PROFESSIONAL ENGINEER
17807
OREGON
JULY 25, 1995
CHRIS CARMAN

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REGION 2 TECH CENTER

I-5: NORTH SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Reviewed By - Alvin Shoblom
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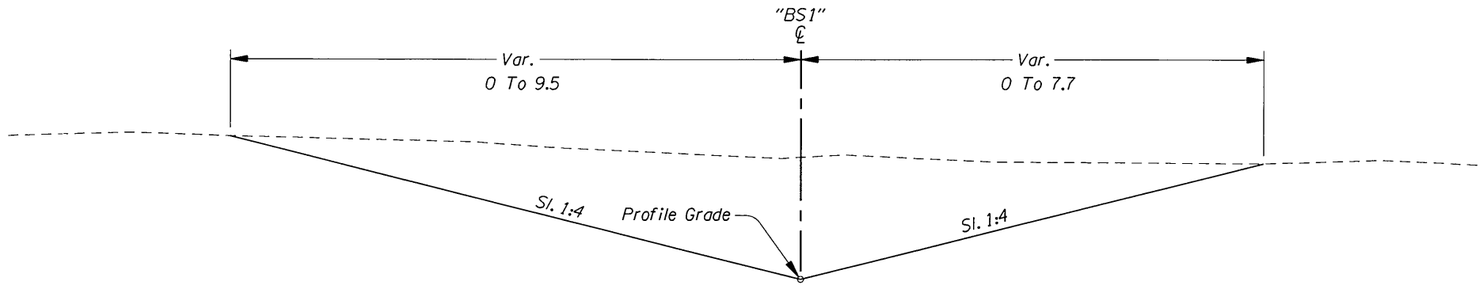
Drafted By - Chris Shearer

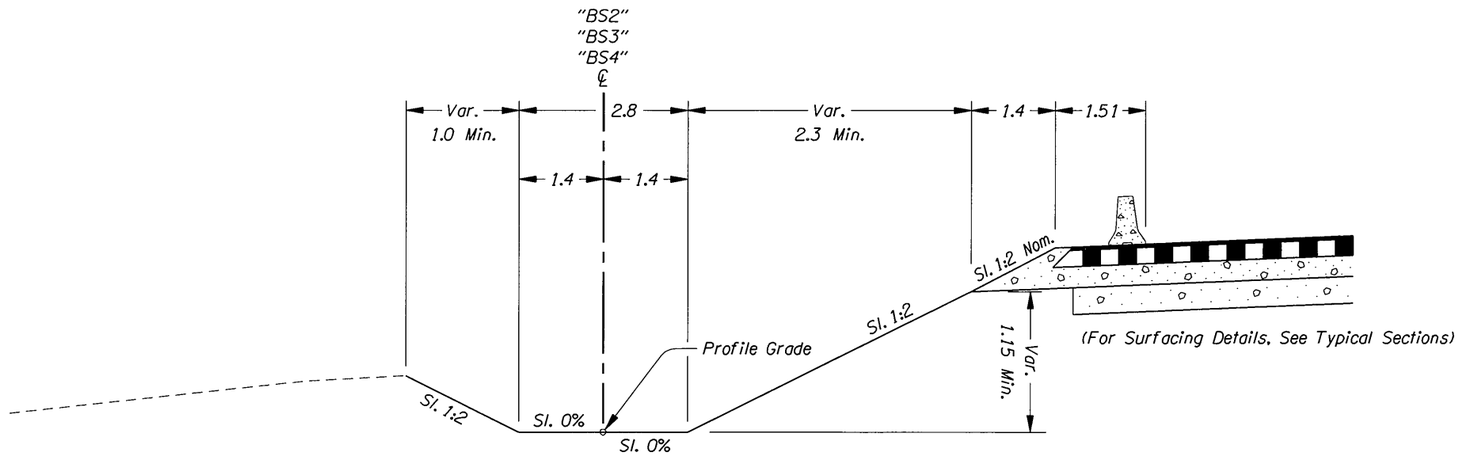
WATER QUALITY SWALE DETAILS

SHEET NO. GJ-8



(For Planting Details, See Roadside Development Plans)

WATER QUALITY SWALE
STA. "L"11+654.4 To STA. "L"11+690.1, Lt.



(For Surfacing Details, See Typical Sections)

(For Planting Details, See Roadside Development Plans)

WATER QUALITY SWALES

STA.	"L"12+000.9	To STA.	"L"12+004.3	(Taper Section)
	"L"12+004.3	To	"L"12+176.5	
	"L"12+176.5	To	"L"12+207.2	(Taper Section)
	"L"12+240.2	To	"L"12+258.5	(Taper Section)
	"L"12+258.5	To	"NB"12+770.0	
	"NB"12+770.0	To	"NB"12+774.0	(Taper Section)
	"NB"13+116.1	To	"NB"13+120.0	(Taper Section)
	"NB"13+120.0	To	"NB"13+400.0	
	"NB"13+400.0	To	"NB"13+403.9	(Taper Section)
	"NB"13+648.0	To	"NB"13+656.0	(Taper Section)
	"NB"13+656.0	To	"NB"13+787.0	
	"NB"13+787.0	To	"NB"13+790.9	(Taper Section)

All Dimensions Are Shown In Meters (m) Unless Otherwise Noted.

REGISTERED PROFESSIONAL ENGINEER
14,931
Carol A. Cartwright
OREGON
JULY 25, 1990
CAROL A. CARTWRIGHT
Expires Dec. 31, 2005

OREGON DEPARTMENT OF TRANSPORTATION
ROADWAY ENGINEERING SECTION

I-5: N. SANTIAM HWY. - KUEBLER BLVD. (SALEM) SEC.
PACIFIC HIGHWAY
MARION COUNTY

Design Team Leader - Carol Cartwright
Designed By - John Lucas
Drafted By - Jeff Larson

DETAILS

SHEET NO. 2B-9